

Date: Wednesday, 22/04/2009 11:40:55 AM
 User: Julie Dawson

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : 212 X-TUBE ,LOW STANDARD FWD
 Job Number : 47370
 Estimate Number : 13018
 P.O. Number :
 This Issue : 22/04/2009 S.O. No. :
 Prsht Rev. : NC
 First Issue : // Type : CROSSTUBES
 Previous Run : 47369
 Written By :
 Checked & Approved By : JLD 09.04.22
 Comment : Est Rev:A New Issue 07.09.12 EC verified by: JLM
 Est Rev:B ECN 1100 08-01-11 DD verified by: EC
 Est Rev:C Ecn 1121 08-02-25 DD Verified by:ec

Part Number : D212664107
 Drawing Number : D212-664-147 REV A
 Project Number : N/A
 Drawing Revision : A
 Material :
 Due Date : 29/04/2009 Qty: 1 Um: Each

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



HJ for JLD 09/05/11



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D212-664-107 CHG001

8 09/05/14

2.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

3.0 D212664107TRN Crosstube Turning Detail



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch *B-47581*

MB

09-05-04

①

4.0 BENDING BENDING MACHINE - SKIDTUBES



MR

09-05-05



①

Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

5.0 QC15 DIMENSIONAL CHECK OF X-TUBES



JLD 09.05.05 ①



Comment: DIMENSIONAL CHECK OF X-TUBES

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

6.0

D36591

CUFF



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

CUFF

Batch: 37426

AT 09-05-06

7.0

CROSTUBES

CROSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill Rivet holes as per Dwg D212-664-147 using DT8972.

2-Drill pilot holes in tube as per Dwg D212-664-147

3-Ream hole to finish size in tube as per Dwg D212-664-147

4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-147

5-Scribe part # and batch # using vibrating stylus as per Dwg D212-664

AT 09-05-06

AT 09-05-06

PTO

AWM
9-5-6

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube & Cuffs as per QSI 005 4.1

AWM 9-5-6

9.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

S 09/05/06

10.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

S 09/05/06

11.0

OUTSIDE SERV.10

OUTSIDE SERVICES -skids



Comment: Sub-Contracting OUTSIDE SERVICES


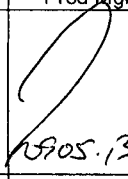
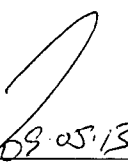
Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 8757 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

C 20905/07
①

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
9-5-5	7.1	Please add; Cut tube as per QC 15 inspection DWG. D212-664-107 perm change / good idem		9-5-5 09/05/14		 09.05.13	 09.05.13

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Job Number: 47370

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

09/05/07 (1)

13.0

QC5

INSPECT WORK TO CURRENT STEP



ml 09 05 08



(1)

Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

14.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Rivet Cuffs as per Dwg D212-664-147. with Sika flex in Between tube & Cuff

A/R SIKAFLEX -241/-291 BATCH: 111081

ml 09 05 08 (1)

15.0

CR3212406

CHERRY RIVET



Comment: Qty.: 44.0000 Each(s)/Unit Total : 44.0000 Each(s)

CHERRY RIVET

Batch: 167376

ml 09 05 08

16.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: 7:00

Finish Time: 8:46

PAINT:

Start Time: 10:54

Finish Time: 1:50

ml 09-05-11 (1)

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Job Number: 47370

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

17.0

QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

09.05.12 ①

18.0

D28931

2.75 Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Support

42440

ml 09.05.12

19.0

D3595063450

RUBBER CUSHION



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Rubber Cushion

Batch:

43210

ml 09.05.12

20.0

MS2192025

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Clamp

Batch:

109955

ml 09.05.12

21.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1- Assemble as per Dwg D212-664-147

2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

3- Instal support with magnobond 6398 per dwg D212-664-147,
cure for 12hrs before packaging.

Time & date of application:

3:45pm

Batch:

111249

EXP. DATE

02/2010

Torque: ml 09 05 13 ①

ml 09 05 12 ①

22.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

09.05.13 ①

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

23.0

AN635A

BOLT



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

BOLT

batch M109282

9/5/13

SP

24.0

AN636A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

batch M11155

9/5/13

SP

25.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

batch M110002

9/5/13

SP

26.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

batch M111193

9/5/13

SP

27.0

D34281

Placard



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Placard

batch D45182

9/5/13

(14)

SP

28.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

8/6/14

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Identify and pack for shipping as per PPP D212.664-107

A 1/24/14

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Job Number: 47370

Part Number: D212664107

Job Number:



Seq. #:

Machine Or Operation:

Description :

30.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

31.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

09/05/1498

Job Completion



mf
09-05-14

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

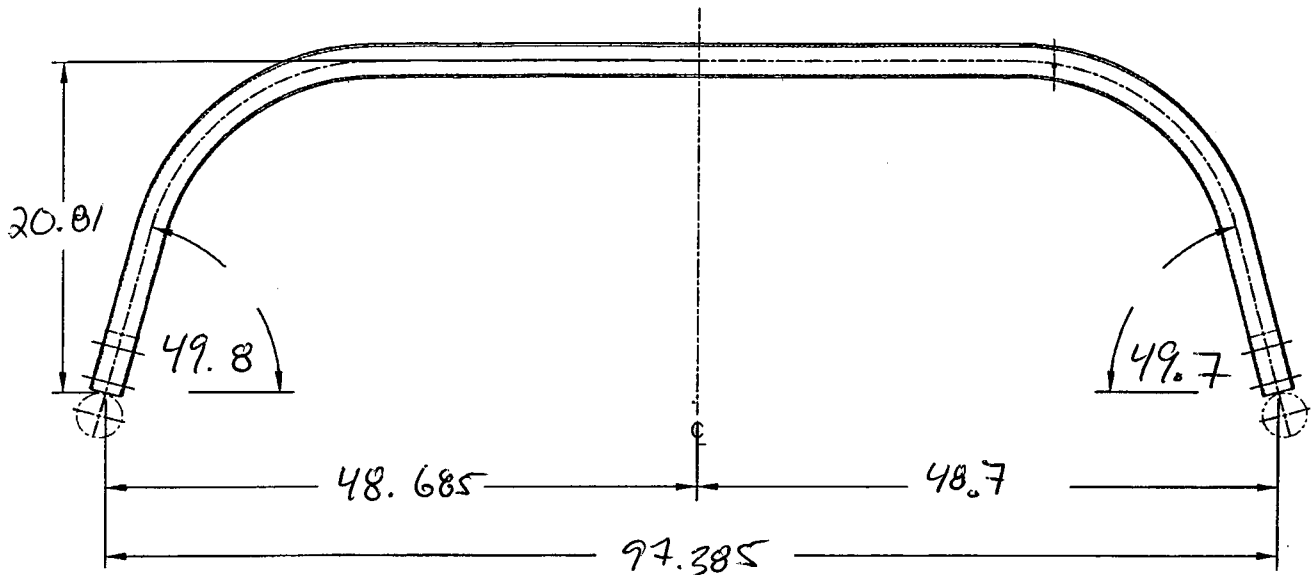
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DART AEROSPACE LTD		Work Order:	47370
Description: Crosstube Low Fwd (205/212/412)		Part Number:	D212-664-107
Inspection Dwg: D212-664-147 Rev: A		Page 1 of 1	

Required Dimension	Min	Max
Height	20.79	21.05
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62



Comments

QC15 Inspection	
Date	05-05-05

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	

W/O:		WORK ORDER CHANGES					
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PARTS LIST:

Qty	Part Number	Description
X	D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
1	D6019-128	CROSSTUBE
2	D2893-1	SUPPORT
4	D3595-063-450	RUBBER CUSHION
2	D3659-1	CUFF
4	MS21920-25	CLAMP (OR MS21920-26)
44	CR3212-4-06	RIVET (OR M7885/3-4-06)
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6019-128
FINISHED LENGTH = 126.53±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) ALL DIMENSIONS ARE IN INCHES
- 5) PART IS SYMMETRIC ABOUT CENTERLINE.
- 6) WHEN MACHINING TAPER, RUN-OFF PART AT STOCK. BLEND OUT EDGE LONGITUDINALLY,
TRANSITION SHOULD BE SMOOTH.
- 7) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE
TO BENDING IS 6% BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 8) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 9) SCRIBE DART PART NUMBER AND BATCH NUMBER ON INNER SURFACE OF TUBE WITH A
VIBRATING STYLUS.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS
SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT
LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1
THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER
INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE
D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE
CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY
AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 14) INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A
LAYER OF SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN
CUFF AND CROSSTUBE. SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 15) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

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07.07.07

NO. 13370
WORK ORDER
SUBJECT TO AMENDMENT
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A		07.07.07	NEW ISSUE
DESIGN	GP	DRAWN BY	GP
CHECKED	GP	APPROVED	GP
DATE	07.07.07	DRAWING NO. D212-664-147	
COPYRIGHT © 2007 BY DART AEROSPACE LTD.		DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA	
THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.		SHEET 1 OF 3 SCALE CROSSTUBE (205/212/412 LOW FWD) NTS	

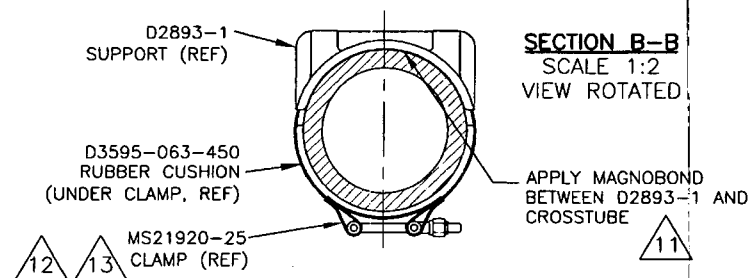
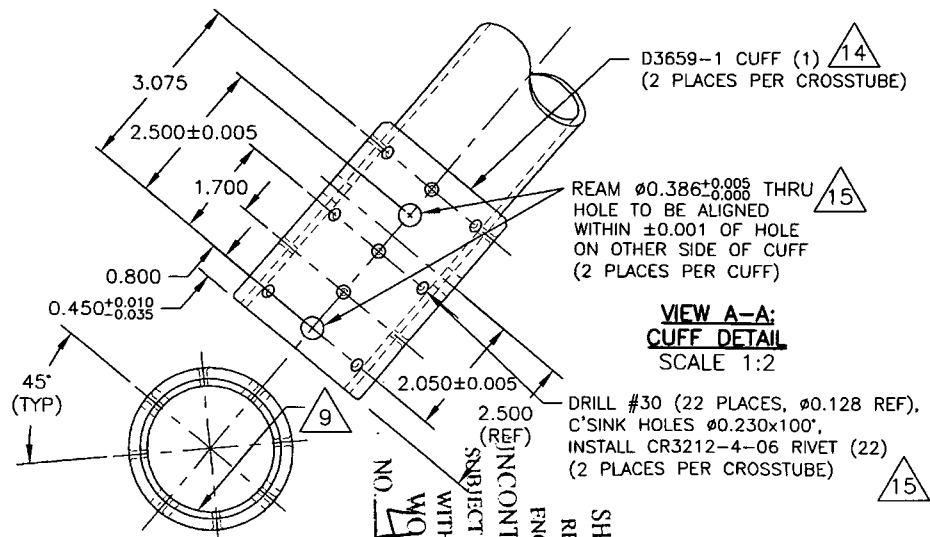
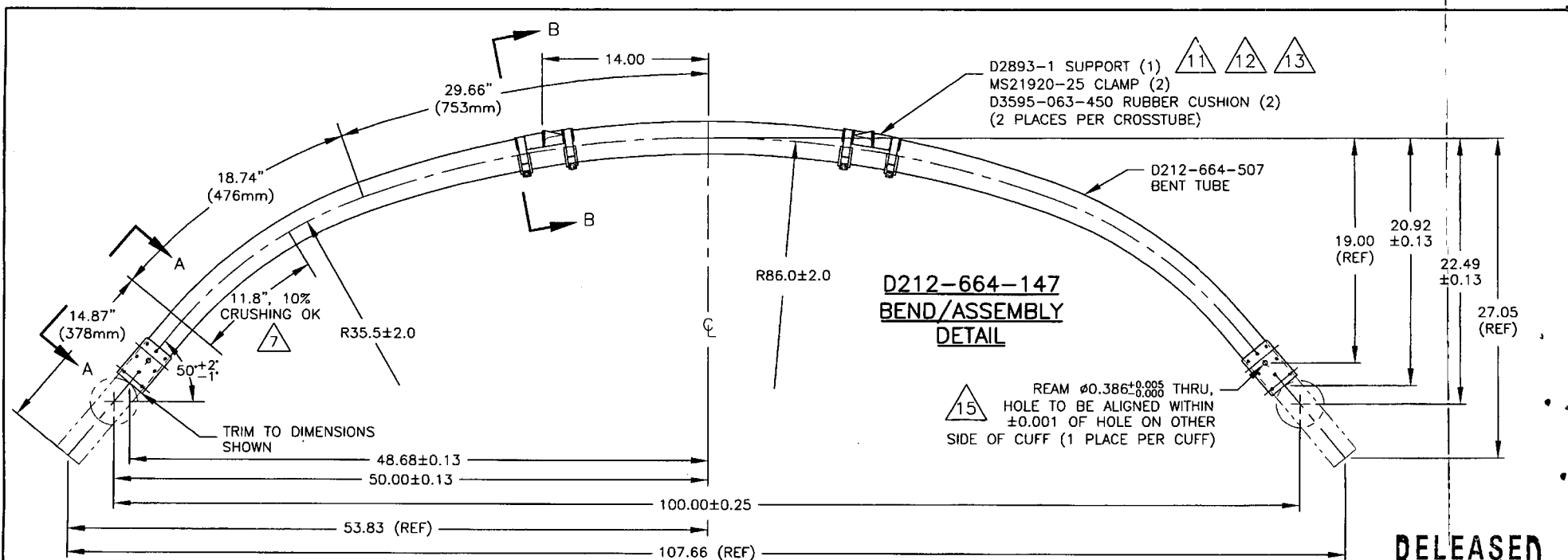
W/O:		WORK ORDER CHANGES					
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NOTE: Date & initial all entries



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	CHECKED	APPROVED				DRAWING NO.	REV. A
	DATE	TITLE				SHEET 2 OF 3	SCALE
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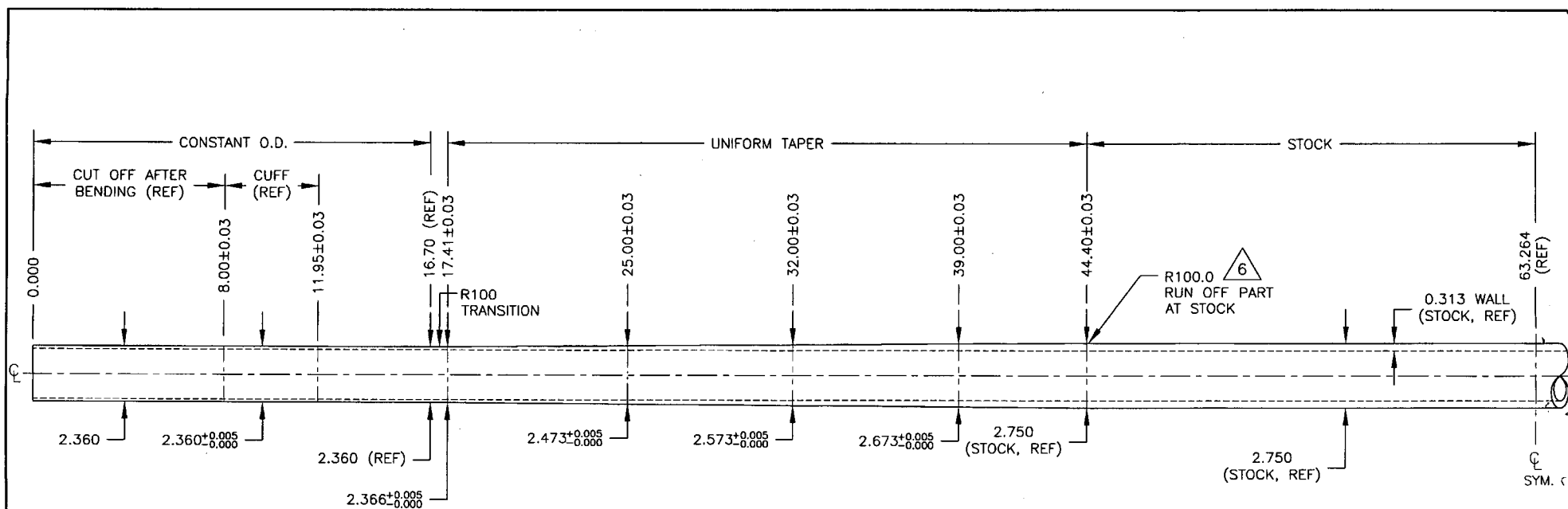
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D212-664-147 MACHINING DETAIL

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#7.07.24

NO. 10
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DATE 07.07.07		TITLE CROSSTUBE (205/212/412 LOW FWD) 1:4		

W/O:		WORK ORDER CHANGES					
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LIQUID PENETRANT TEST REPORT

P- 14939

CLIENT	DART AEROSPACE	DATE	MAY 7, 09	PAGE	1	OF	1	
ATTENTION	CHANTEL	ACUREN JOB NO.	188-09-001395	TIME	AM	<input checked="" type="checkbox"/>	PM	<input type="checkbox"/>
ADDRESS	1270 ABELDEN HACKENSACK, NJ K&H 1K7	PO/NO.	8757	WORK LOCATION	MAN SHOP			
PROJECT	F.P.T. ON CROSS TUBES	ACCEPTANCE STD.	ASTM 1417	REV./DATE	2007			
ITEM(S) EXAMINED								

JOB DESCRIPTION	PROCEDURE NO. LT-XXXX REV./DATE	TECHNIQUE NO. LT-XXXX-XXX REV./DATE
PART NO.	MATERIAL ALUMINUM THICKNESS	
SCOPE	WET FLUORESCENT LIQUID PENETRANT INSPECTION CARRIED OUT ON 100% EXTERNAL	

TEST DETAILS	
METHOD <input checked="" type="checkbox"/> FLUORESCENT <input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> WATER WASH <input type="checkbox"/> SOLVENT REMOVABLE <input type="checkbox"/> POST EMULSIFIED
FAMILY BRAND MAGNAFLUX	BLACK LIGHT S/N IP65 <input type="checkbox"/> OUTPUT > 1000 μ W/cm ² <input type="checkbox"/> AMBIENT < 2 fc
PENETRANT 2LC7 MINIMUM DWELL TIME 4510 MIN.	LIGHTING EQUIP. <input type="checkbox"/> FLASHLIGHT <input type="checkbox"/> TROUBLELIGHT <input type="checkbox"/> OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER 1120 MINIMUM DRY TIME > 10 MIN.	OTHER LAB: NO
DEVELOPER SKD 52 MINIMUM DWELL TIME 10 MIN.	LIGHT METER S/N
DEVELOPER TYPE <input checked="" type="checkbox"/> NON AQUEOUS <input type="checkbox"/> AQUEOUS <input type="checkbox"/> DRY	CAL DUE DATE FEB 2008

TEST SURFACE	
SURFACE CONDITION <input type="checkbox"/> AS GROUND <input type="checkbox"/> AS WELDED <input type="checkbox"/> MACHINED <input type="checkbox"/> SHOT BLASTED <input type="checkbox"/> CLEAN BARE METAL	
SURFACE TEMPERATURE <input type="checkbox"/> < - 4°C/ 20°F <input type="checkbox"/> - 4°C/ 20°F TO 10°C/ 50°F <input type="checkbox"/> 10°C/ 50°F TO 52°C/ 125°F <input type="checkbox"/> > 52°C/ 125°F	

RESULTS- (<input type="checkbox"/> METRIC <input type="checkbox"/> IMPERIAL)	
	ACCEPT REJECT
2- JOB NUMBER 47370	✓
1- 47752	✓
1- 47753	✓
THESE THREE ITEMS WERE FOUND ACCEPTABLE	

Scope of Services
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES		
CLIENT REPRESENTATIVE	MATTHEW MURDOCH	DTR # E-27913
TECHNICIAN (SIGNATURE):	Mike Johnston	REPORT REVIEWED BY:
NAME (PRINT):	1 ST TECHNICIAN	NAME INITIALS
CGSB LEVEL II SNT LEVEL	2 ND TECHNICIAN	
CGSB REG. No 6-066	CGSB REG. No	